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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,127	10/16/2003	Sarah E. Kim	ITL.1041US (P14808)	7337
21906	7590	11/30/2005	EXAMINER	
TROP PRUNER & HU, PC 8554 KATY FREEWAY SUITE 100 HOUSTON, TX 77024			SOWARD, IDA M	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 11/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/687,127	Applicant(s) KIM ET AL.	
	Examiner Ida M. Soward	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11, 12, 18, 20, 22, 24-27 and 31 is/are rejected.
- 7) ☒ Claim(s) 3-17, 19, 21, 23 and 28-30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the Applicants' amendment filed September 12, 2005.

Claim Objections

Claim 12 is objected to because of the following informalities: "channels" should have been microchannels in line 2. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claim 18 recites the limitation "said heat generating integrated circuit chips" in lines 1-2.
2. Claim 19 recites the limitation "said ports" in line 1.
3. Claim 30 recites the limitation "said cooling electroosmotic pumps" in line 1.

There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11-12, 18, 20, 22, 24-27 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akamatsu et al. (5,420,753) in view of Wu (5,754,399).

In regard to claim 11, Akamatsu et al. teach a packaged integrated circuit structure comprising:

a pair of integrated circuit chips 2 (the two outer chips); a cooling integrated circuit chip 2 (the center chip) between said pair of integrated circuit chips 2 (the two outer chips), said cooling integrated circuit chip 2 (the center chip) including microchannels 23 & 24 for the circulation of a cooling fluid; and a package containing said integrated circuit chips 2 (the two outer chips) (Figure 2, column 3, lines 10-38).

In regard to claim 12, Akamatsu et al. teach a first trench 14 for containing a fluid so as to communicate from the exterior of said cooling integrated circuit chip 2 (the center chip) with said channels (Figure 2, column 3, lines 10-38).

In regard to claim 18 and as best understood, Akamatsu et al. teach the edges of said heat generating integrated circuit chips 2 are sealed (Figure 2, column 3, lines 10-38).

In regard to claim 20, Akamatsu et al. teach electrical vias 12 coupling the integrated circuit chips (Figure 6, column 5, lines 16-23).

In regard to claim 22, Akamatsu et al. teach a packaged integrated circuit structure comprising: a stack (Figure 10) including a pair of integrated circuit chips 2 (the two outer chips) and a cooling integrated circuit chip 2 (the center chip) between

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said pair of integrated circuit chips 2 (the two outer chips), said cooling integrated circuit chip 2 (the center chip) including microchannels 23 & 24 for the circulation of a cooling fluid; a package receiving said stack (Figure 10), said package having formed therein an inlet fluid reservoir 11a (Figure 9) and an outlet fluid reservoir 11b (Figure 9) to communicate with said microchannels 23 & 24; and a path 14 to recycle fluid from said outlet fluid reservoir 11b to said inlet fluid reservoir 11a (Figures 2 and 9-10, columns 3 and 6, lines 10-38 and 29-68, respectively).

In regard to claim 24, Akamatsu et al. teach a path 11 on the exterior of the package (Figure 2, column 3, lines 10-38).

In regard to claim 25, Akamatsu et al. teach the edges of the integrated circuit chips 2 being sealed (Figure 2, column 3, lines 10-38).

In regard to claim 26, Akamatsu et al. teach the stack in contact with the fluid reservoirs 11 (Figures 9-10, column 6, lines 29-68).

In regard to claim 27, Akamatsu et al. teach the microchannels communicate with the edges of the cooling integrated circuit chip 2 (the center chip) (Figure 2, column 3, lines 10-38).

In regard to claim 31, Akamatsu et al. teach a plurality of temperature sensors to enable temperature controlled cooling (column 7, lines 41-45).

However Akamatsu et al. fails to teach cooling integrated circuit chips.

Wu teaches cooling integrated circuit chips (column 10, lines 26-32).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the packaged integrated circuit structure as

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taught by Akamatsu et al. with the packaged integrate circuit structure having cooling integrated circuit chips as taught by Wu to improve device performance (column 2, lines 15-18).

Allowable Subject Matter

Claims 13-17, 21, 23 and 28-29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 19 and 30 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments with respect to claims 11-12, 18, 20, 22, 24-27 and 31 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of the art with respect to cooling integrated circuit structures:

Chu et al. (US 6,366,462 B1)

Chu et al. (US 6,548,894 B2)

Duesman et al. (US 6,449,161 B2)

Gaynes et al. (US 6,661,661 B2).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M. Soward whose telephone number is 571-272-1845. The examiner can normally be reached on Monday - Thursday 6:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra V. Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

IMS
November 28, 2005

Ida M. Soward
AU 2822